

## § 7.505

(1) When used in accordance with the manufacturer's instructions and defined limitations, the apparent temperature in the fully occupied refuge alternative shall not exceed 95 degrees Fahrenheit (°F).

(2) Tests shall be conducted to determine the maximum apparent temperature in the refuge alternative when used at maximum occupancy and in conjunction with required components. Test results including calculations shall be reported in the application.

(c) The refuge alternative shall include:

(1) A two-way communication facility that is a part of the mine communication system, which can be used from inside the refuge alternative; and accommodations for an additional communication system and other requirements as defined in the communications portion of the operator's approved Emergency Response Plan.

(2) Lighting sufficient for persons to perform tasks.

(3) A means to contain human waste effectively and minimize objectionable odors.

(4) First aid supplies.

(5) Materials, parts, and tools for repair of components.

(6) A fire extinguisher that—

(i) Meets the requirements for portable fire extinguishers used in underground coal mines under part 75;

(ii) Is appropriate for extinguishing fires involving the chemicals used for harmful gas removal; and

(iii) Uses a low-toxicity extinguishing agent that does not produce a hazardous by-product when deployed.

(d) Containers used for storage of refuge alternative components or provisions shall be—

(1) Airtight, waterproof, and rodent-proof;

(2) Easy to open and close without the use of tools; and

(3) Conspicuously marked with an expiration date and instructions for use.

### § 7.505 Structural components.

(a) The structure shall—

(1) Provide at least 15 square feet of floor space per person and 30 to 60 cubic feet of volume per person according to the following chart. The airlock can be included in the space and volume if

## 30 CFR Ch. I (7–1–18 Edition)

waste is disposed outside the refuge alternative.

Mining height (inches)	Unrestricted volume (cubic feet) per person *
36 or less .....	30
>36–≤42 .....	37.5
>42–≤48 .....	45
>48–≤54 .....	52.5
>54 .....	60

\* Includes an adjustment of 12 inches for clearances.

(2) Include storage space that secures and protects the components during transportation and that permits ready access to components for maintenance examinations.

(3) Include an airlock that creates a barrier and isolates the interior space from the mine atmosphere, except for a refuge alternative capable of maintaining adequate positive pressure.

(i) The airlock shall be designed for multiple uses to accommodate the structure's maximum occupancy.

(ii) The airlock shall be configured to accommodate a stretcher without compromising its function.

(4) Be designed and made to withstand 15 pounds per square inch (psi) overpressure for 0.2 seconds prior to deployment.

(5) Be designed and made to withstand exposure to a flash fire of 300 °F for 3 seconds prior to deployment.

(6) Be made with materials that do not have a potential to ignite or are MSHA-approved.

(7) Be made from reinforced material that has sufficient durability to withstand routine handling and resist puncture and tearing during deployment and use.

(8) Be guarded or reinforced to prevent damage to the structure that would hinder deployment, entry, or use.

(9) Permit measurement of outside gas concentrations without exiting the structure or allowing entry of the outside atmosphere.

(b) Inspections or tests shall be conducted as follows:

(1) A test shall be conducted to demonstrate that trained persons can fully deploy the structure, without the use of tools, within 10 minutes of reaching the refuge alternative.

(2) A test shall be conducted to demonstrate that an overpressure of 15 psi applied to the pre-deployed refuge alternative structure for 0.2 seconds does not allow gases to pass through the structure separating the interior and exterior atmospheres.

(3) A test shall be conducted to demonstrate that a flash fire of 300 °F for 3 seconds does not allow gases to pass from the outside to the inside of the structure.

(4) An inspection shall be conducted to determine that the overpressure forces of 15 psi applied to the pre-deployed refuge alternative structure for 0.2 seconds does not prevent the stored components from operating.

(5) An inspection shall be conducted to determine that a flash fire of 300 °F for 3 seconds does not prevent the stored components from operating.

(6) A test shall be conducted to demonstrate that each structure resists puncture and tearing when tested in accordance with ASTM D2582-07 "Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting." This publication is incorporated by reference. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. A copy may be obtained from the American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959; 610-832-9500; <http://www.astm.org>. A copy may be inspected at any MSHA Coal Mine Safety and Health District Office; or at MSHA's Office of Standards, Regulations, and Variances, 201 12th Street South, Arlington, VA 22202-5452; 202-693-9440; or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html).

(7) A test shall be conducted to demonstrate that each reasonably anticipated repair can be completed within 10 minutes of opening the storage space for repair materials and tools.

(8) A test shall be conducted to demonstrate that no harmful gases or no-

ticeable odors are released from non-metallic materials before or after the flash fire test. The test shall identify the gases released and determine their concentrations.

(c) If pressurized air is used to deploy the structure or maintain its shape, the structure shall—

(1) Include a pressure regulator or other means to prevent over pressurization of the structure, and

(2) Provide a means to repair and repressurize the structure in case of failure of the structure or loss of air pressure.

(d) The refuge alternative structure shall provide a means—

(1) To conduct a preshift examination, without entering the structure, of components critical for deployment; and

(2) To indicate unauthorized entry or tampering.

[73 FR 80694, Dec. 31, 2008, as amended at 80 FR 52985, Sept. 2, 2015]

#### § 7.506 Breathable air components.

(a) Breathable air shall be supplied by compressed air cylinders, compressed breathable-oxygen cylinders, or boreholes with fans installed on the surface or compressors installed on the surface. Only uncontaminated breathable air shall be supplied to the refuge alternative.

(b) Mechanisms shall be provided and procedures shall be included so that, within the refuge alternative,—

(1) The breathable air sustains each person for 96 hours,

(2) The oxygen concentration is maintained at levels between 18.5 and 23 percent, and

(3) The average carbon dioxide concentration is 1.0 percent or less and excursions do not exceed 2.5 percent.

(c) Breathable air supplied by compressed air from cylinders, fans, or compressors shall provide a minimum flow rate of 12.5 cubic feet per minute of breathable air for each person.

(1) Fans or compressors shall meet the following:

(i) Be equipped with a carbon monoxide detector located at the surface that automatically provides a visual and audible alarm if carbon monoxide in supplied air exceeds 10 parts per million (ppm).